MAX DRONE SERVICE SAFETY RISK MANAGEMENT (SRM) CASE

PURPOSE

The following Safety Risk Management (SRM) case is submitted as part of the mitigations Max Drone Service will incorporate during operations under their requested Petition for an Exemption to Conduct Unmanned Aircraft Systems (UAS) Operations Allowed by Special authority for certain unmanned aircraft systems. Title 49 U.S.C. § 44807, and 14 C.F.R. Part 11 to Authorize Commercial Agricultural- Related Services with UAS Weighing 55 Pounds or More for the DJI Agras T-30.

This SRM is triggered because of the accompanying Petition for Exemption for the DJI Agras T-30 is seeking relief from previous approved exemptions conditions and limitations of number 27c issued by the Federal Aviation Administration (FAA). This relief is now **considered a summary grant** as there have been previous approvals to petitions seeking the same. See FAA Exemption No. 18852 and FAA Exemption No. 18413A.

Condition and Limitation Number 27c states that:

27. *All flight operations must be conducted at least 500 feet from all persons who are not directly participating in the operation, and from vessels, vehicles, and structures, unless when operating:*

c. Near vessels vehicles and structures. Prior to conducting operations, the operator must obtain permission from a person with the legal authority over any vessels, vehicles or structures that will be within 500 feet of the UA during operations. The PIC must make a safety assessment of the risk of operating closer to those objects and determine that it does not present an undue hazard.

Max Drone Service will have permission from all persons with legal authority within 500 ft. of structures when applicable, prior to any flight operations. However, it is the vehicle language specifically within 27c that Max Drone Service seeks relief from. It is completely impractical during routine crop spraying operations to stop each moving vehicle to seek permission to fly adjacent to the road at no more than 10-50 feet AGL.

The following is a list of potential hazards identified to substantiate their request for relief of Number 27C (Vehicles). These mitigations are in addition to Max Drone Service current SMS Program (included with the Petition for Exemption), supported by various levels of policies and procedures that underline safety protocols throughout the company

PROXIMITY AND RISK MANAGEMENT

Max Drone Service will be employing two different methods of protecting persons in vehicles within or around the operations area, based upon a containment method and a probabilistic method. Both will be employed together in determining mitigations and control measures.

- Containment method will be within already low density remote sterile airspace and will include mitigations such as enhanced equipment and software, altitude, propulsion restrictions, geofencing, obstacle

avoidance, and geographical alignment, The overall goal in containment methodology is to contain 100% of the UAS failure debris within this controlled area in the event a mishap occurs.

- Probabilistic Risk Assessment (PRA) is the process by which probability and severity of the hazards are defined for a specific operation. This results in a subjective expression of risk and is a structured and logical analysis aimed at identifying and assessing risks in complex technological systems. For example, the purpose of a PRA might include identifying and assessing Near Mid-Air Collision (NMAC) risk. The results provide an estimate of mission outcome likelihood and encounter probability with casualty expectation with other users of the airspace while the UAS is flying in a particular volume of airspace. Based on available design data, the process could identify major risk contributors rather than all possible risk contributors and apply estimates for those major hazard likelihoods to a set of scenarios. An example of an objective would be to estimate the probability that the UAS would successfully transit the proposed volume of airspace without encountering a vehicle at the same time within a pre-determined criteria. The PRA process would use operational and functional system performance estimates, and their associated hazards, to evaluate the ability to mitigate risk.

SAFETY RISK MANAGEMENT ANALYSIS

An analysis of each of the hazards and outcomes identified in the chart below is provided in the following format with controls in accordance (IAW) FAA Order 8040.4 (as amended) and FAA Order 8040.6 (as amended) and provides information pertaining to each of the following elements of the operation along with strategic and tactical mitigations.

I. Aircraft
II. Airman/Operator
III. Airspace/Operating environment
IV. Emergency Procedures

Identify Hazards and Outcomes

Hazard Identified	Hazard Definition	Potential Causes	Existing Controls	Possible Outcomes
Technical Issue with UAS	Malfunction of a technical component of the UAS, which causes a deviation from planned operations.	• Motor failure • Software failure • Lost Link • GPS Failure • Battery failure • UA leaves planned route • UA leaves established setback boundaries	• Redundant flight controls • Onboard D-RTK • Competent PIC and flight crew trained and current in abnormal and emergency situations • Emergency procedures in place and validated • Lost-link safety default feature allows the UAS to automatically hover and land in response to a lost-link event. • Failsafe RTH • UAS maintained IAW all manufacturer maintenance procedures and remains in a flight ready condition • Preflight checks of UAS for every mission • UAS manufactured by competent or proven entity • Restricted by speed; reduced kinetic energy • Restricted by altitude • Operations over rural uninhabited, private	• Collision between UAS and a manned aircraft in the air • Collision between a UAS and person on ground or moving vehicle • Collision between a UAS and critical infrastructure on the ground

			or restricted-access land • T-30 Intelligent flight battery with reserve battery power • DBF Imaging Radar • Flight limits and Geofencing zones • PIC required to give way to all other manned aircraft • Lateral setback boundary established to contain debris	
Deterioration of external systems supporting the UAS operation	Malfunction of any component that is not a part of the UAS but supports safe operations.	• GPS signal degradation • Ground station Malfunction • Communication malfunction between PIC and VO	• Built in signal redundancies • Smart and failsafe RTH features • Manual override control features • GPS warning/indicator lights • PIC will follow the procedures outlined in the aircraft operator's manual for GPS failure • UAS is designed to manage the deterioration of external systems supporting the UAS operation • Cellular Phone, voice actuated headsets, Hand signals • If communication is lost and cannot be re-established within 3 seconds the PIC will immediately land the UAS. • PIC will and give way to all manned aviation operation and activities, at all times	• Collision between UAS and a manned aircraft in the air • Collision between a UAS and person on ground or moving vehicle • Collision between a UAS and critical infrastructure on the ground
Human Error (Human Factor)	A person's mistake rather than the failure of a machine, causing a deviation from planned operations.	• Pilot error • Maintenance Errors • Preflight Planning Errors • Mission and route planning errors • Flight into unplanned weather	• All crewmembers are trained and current with complete knowledge of the regulations, limitations, restrictions under which they operate as a Part 107 certified remote pilot and Part 137 certified agricultural operator. • Multi-crew coordination and VO with instant communications with the PIC • UAS maintained IAW manufacturer procedures and remain in a flight ready condition • Preflight procedures in place and validated • Crew fit to operate – comply with drug and alcohol provisions of §§91.17 and 91.19 • Automated protection of the flight envelope from human error • Crew resource management IAW FAA AC 120-51, or accepted equivalent adhered to • Sterile cockpit procedures adhered to • Flights in VMC conditions only • Failsafe RTH feature	• Collision between UAS and a manned aircraft in the air • Collision between a UAS and person on ground or moving vehicle • Collision between a UAS and critical infrastructure on the ground

Adverse Operating Conditions	Operating into or within conditions that the UAS wasn't intended to, which causes a deviation from planned operations.	• Un-forecasted weather • Reduced visibility • Climate and topography unique weather	• Operations in VMC conditions with at least 3 miles visibility and 1500-foot ceiling adhered to • The PIC and the VOs trained to identify critical environmental conditions and to avoid them • Environmental conditions for safe operations are defined, measurable and adhered to • UAS designed and qualified for adverse environmental conditions • PIC will always give way to all manned aviation operation and activities.	• Collision between UAS and a manned aircraft in the air • Collision between a UAS and person on ground or moving vehicle • Collision between a UAS and critical infrastructure on the ground
Unable to Maintain VLOS	Inability to maintain VLOS with the UAS causing a deviation from planned operations.	• Communication failure between VOs • Traffic conflicts; helicopter routes/uncharted landing surfaces • Inability to comply with 14 CFR Parts §91.113 and §107.37 • Unexpected Low altitude General Aviation (GA) Operations	• Effective two-way communications between VO and PIC procedures adhered to • PIC and VOs properly trained in 14 CFR Parts 91.113 and 107.37 • PIC and VO positioned at visual vantage points in the operations area • Time of day operating restrictions • Restricting operations within certain boundaries or airspace volumes • Restricting operational flight time • Altitude restricted • Low altitude and proximity to certain structures; prohibits manned flights • Flight termination in the event the PIC or a VO is unable to maintain VLOS with the UAS during flight • PIC will and give way to all manned aviation operation and activities, at all times	• Collision between UAS and a manned aircraft in the air

I. AIRCRAFT

A. AIRCRAFT SAFETY FEATURES

1. Initial Airworthiness Review

In additional to the FOPM, all UAS operations will be conducted in accordance with (IAW) the DJI AGRAS T-30, operating manuals. Aircraft will be operated in a flight ready condition at all times and aviation personnel are expected to utilize sound, conservative judgment in their approach to their duties.

In accordance with the statutory criteria provided in 14 CFR part 107, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, Max Drone Service expects no adverse safety affects to participating or nonparticipating individuals compared to a manned aircraft that holds a standard airworthiness certificate performing a similar operation.

In addition, Max Drone Service has an established inspection and maintenance program for the continued airworthiness of the aircraft in accordance with the manufacture's maintenance, overhaul, replacement, inspection and life limit requirements for the aircraft and aircraft components.

2. Redundant Flight Controls

The T-30 has an aerial-electronics system with a multiple redundancy design, and also has onboard D-RTK antennas, supporting dual-antenna technology that provides strong resistance against magnetic

interference to ensure flight safety. Thanks to the dedicated DJI industrial flight control system, the T-30 offers four operation modes: Route, A-B Route, Manual, and Manual Plus. DJI MG2 automatically produces flight routes based on your planned fields to ensure the aircraft remains inside pre-programmed mission areas.

a. **Signal Redundancies:** The all-new modular aerial-electronics system in the T-30 has dual IMUs and barometers and adopts a propulsion signal redundancy design to ensure flight safety. The GNSS+RTK dual-redundancy system supports centimeter-level positioning. It also supports dual-antenna technology that provides strong resistance against magnetic interference.
b. **Onboard Radar:** The T-30's upgraded radar system can sense the operating environment during the day or at night, without being affected by light or dust. It has greatly improved flight safety with forward and backward obstacle avoidance and a horizontal FOV (field of view) of 100°, double that of previous DJI agricultural drones. It can also detect the angle of a slope and adjust to it automatically even in mountainous terrain. This innovative radar system adopts Digital Beam Forming (DBF) technology, which supports 3D point cloud imaging that effectively senses the environment and helps to circumvent obstacles.

c. **P-mode (Positioning):** The aircraft utilizes GNSS or the RTK module for positioning. When the GNSS signal is strong, the aircraft uses GNSS for positioning. When the RTK module is enabled and the differential data transmission is strong, it provides centimeter-level positioning. The aircraft reverts to A-mode when the GNSS signal is weak. The aircraft will fly in P-mode by default.

d. **Geo Fencing and Obstacle Avoidance:** The UA's flight controller is given GPS coordinates of a boundary that it cannot leave, keeping the UA from leaving the pre-determined and defined operations area. When enabled, the UA can "hit" the perimeter, but not fly past or through it. Manual or automatic inputs commanding the UA to break the geofence are ignored. In this case where there is a road along the property line, the operator can use the Ground Station Maps interface and draw a line around the field. This is a perimeter that the drone will not fly outside of. If the operator were to try to fly beyond that boundary, the aircraft would approach the line and stop and hover.

Second, for an obstacle, other property, or people, and purposeful obstacle boundary can be established. This means that the aircraft will build its flight plan and avoid that obstacle. Further, the operator can specify how large of a buffer they would like to keep between the aircraft and that obstacle. Therefore, the coordinates of the road itself can be used as the buffer zone to ensure the aircraft does not cross into that zone.

When operating with a strong GNSS signal, the height and distance limits and GEO Zones work together to monitor flight. With a weak GNSS signal, only the height limit prevents the aircraft from going above 30 meters.

As a reminder, if there was ever a time where a non-participant person or property entered the planned flight area, the operator could also immediately halt the operation by activating the emergency "kill switch" to immediately stop the rotors or may press a switch to activate the emergency return to home feature.

e. **Return to Home:** There are two types of RTH: Smart RTH and Failsafe RTH.

Smart RTH

When GNSS is available to enable Smart RTH, the speed and altitude of the aircraft can be controlled when returning to the home point. The aircraft status indicators will show the current flight mode during RTH. Press the RTH button once or toggle the pause switch to exit Smart RTH and regain manual control of the aircraft.

Failsafe RTH

Failsafe RTH is automatically activated if the remote controller signal is lost for more than three seconds, provided that the home point has been successfully recorded, and the GNSS signal is strong and the RTK module is able to measure the heading of the aircraft. The RTH continues if the remote controller signal is recovered, and users can control the aircraft using the remote controller.

There are two ways to set a home point:

1. Set the current coordinates of the aircraft as the home point.

2. Set the current coordinates of the remote controller as the home point.

Obstacle Avoidance During RTH

Obstacle avoidance during RTH is also available. If there is an obstacle Within 20 m of the aircraft, the aircraft decelerates and then stops and hovers. If the aircraft comes within 6 m of the obstacle while decelerating, the aircraft stops, flies backward, to a distance of approximately 6m from the obstacle, and hovers. The aircraft exits the RTH procedure and waits for further commands.

f. DBF Imaging Radar: The all-new DBF imaging radar works during both day and night, without being affected by light or dust. The radar module can predict the distance between the aircraft and the vegetation or other surfaces in forward, rear, and downward directions to fly at a constant distance to ensure even spraying and terrain following capability. The DBF imaging radar can also detect obstacles 30 m away from the aircraft. The radar module adopts digital beam forming technology, which supports 3D point cloud imaging that effectively senses the environment and helps to circumvent obstacles in both Route and A-B Route operation modes. In addition, radar module limits the descent speed of the aircraft according to the distance between the aircraft and ground, to provide a smooth landing.

The altitude stabilization and obstacle avoidance functions of the radar module are enabled by default and the obstacle avoidance function can be used in any mode. Auto Bypass is disabled by default.

G. Reserve Power: The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power to conduct the intended operation with sufficient reserve such that in the event of an emergency, the PIC can land the aircraft in a known area without posing an undue risk to aircraft or people and property on the ground. In the alternative, if the manufacturer's manual, specifications, or other documents that apply to operation recommend a specific volume of reserve power, the PIC will adhere to the manufacturer's recommendation, as long as it allows the aircraft to conduct the operation with sufficient reserve and maintain power to land the aircraft in a known area without presenting undue risks, should an emergency arise.

2600W 4 Channel Intelligent Battery Charger

Up to four batteries can be charged simultaneously. When using the single-channel quick charging mode, a full charge only takes 20 minutes, a 50% increase in speed from the previous generation. The charger has a built-in battery health management system that monitors critical data in real time, such as voltage and temperature, to ensure charging safety.

T-30 Intelligent Flight Battery

The T-30 Intelligent Flight Battery has a capacity of 17,500 mAh and a 14S high voltage system that reduces power consumption. It is designed with an IP54-rated all-metal housing, and heat dissipation efficiency has increased by 140% from the previous generation. Supported by cell-balancing technology, the battery has an increased charging cycle of up to 400, 100% higher than the previous generation.

h. Emergency brake and return-to-launch (RTL) - The operator has systems that they can use to instantly stop the UA and return it to the base point at a predetermined safe height, respectively.

i. Beacon - In the extremely unlikely event of a system malfunction that causes a crash, a beacon attached to the UA will help the PIC and ground crew quickly locate it, ensuring a quick response to secure the equipment and surrounding area.

j. RTK GPS - The UAS has a telemetry link to a base station which makes GPS corrections, giving the UA an accurate location reading with under 3 feet of precision. (Typically, 50cm). This ensures that the UA is flying the missions it is given and applying herbicides in a pattern much more efficiently and consistently than agricultural helicopters.

k. Redundant GPS- All UAS are equipped with redundant GPS units. Should the primary GPS unit experience a failure, a second GPS unit will automatically take over as a failsafe to ensure accurate positioning and navigation is maintained. Full dual redundancy, automatic switching in real-time between compass, IMU, GPS or controller if one fails.

l. Telemetry - Should a telemetry link to the base station be lost, the UA has all mission parameters stored onboard, and can safely continue to execute a mission. If the RTK link is dropped, the positioning accuracy may drop to around 3m accuracy. Audio alerts on the RC remote and base station computer will alert the PIC, who may opt to allow the UA to continue its mission if it is safe to do so or interrupt the mission and bring the UA back under RC control.

m. **System Data Protection:** In Route or Route A-B operation mode, the System Data Protection feature enables the aircraft to retain vital system data such as operation progress and breakpoints after the aircraft is powered off to replace a battery or refill the spray tank.

During Route operations, in situations when the remote controller disconnects from the aircraft, the breakpoint will be recorded by the flight controller and can be recovered in the app once the aircraft is reconnected.

3. Speed Restrictions

a. Restricted by Speed: The Agras T-30 generally will not be operated at an airspeed exceeding 25 miles per hour or at an airspeed greater than the maximum operating airspeed recommended by the aircraft manufacturer, whichever is lower. However, in locations approaching the boundary setback to roads aircraft can be reduced to a forward speed of no more than 5 mph in both manual and autonomous modes, or hover when necessary prior to the turn along the setback boundary of the for safety.

II. Airman/Operators

A. Crew Member Roles and Responsibilities

1. Pilot in Command (PIC)

The PIC is the holder of a remote pilot certificate with a UAS rating and satisfies the aeronautical knowledge currency requirements of 107.65.

The PIC is responsible for halting or canceling activity in the operations area if, at any time, the safety of persons or property on the surface or in the air is in jeopardy.

The PIC shall have successfully completed the training and qualification process as specified in the DJI AGRAS T-30, User's Manual. PIC qualification flight hours and currency will be logged in a manner consistent with 14 CFR § 61.51(b). Duties include, but are not limited to:

- checking weather and all applicable NOTAMs where available;
- determining the aircraft weight and balance IAW payload and airframe requirements;
- ensuring that all flight planning requirements have been met;
- ensuring that the aircraft is duly registered and that the documentation is available for inspection at the Ground Control Station;
- ensuring that aircraft crew members have valid licenses, medical certificates and passports and visas if required, and are qualified for the mission to be flown;
- completing an aircraft pre-flight inspection before each departure;
- briefing the crew members;
- operating the aircraft in accordance with operator procedures and aircraft limitations IAW the aircraft operators manual;
- completing all post flight duties and recording flight times and aircraft defects.

PIC AUTHORITY

The PIC of a flight is directly responsible for, and is the final authority as to the safe, effective, operation of the aircraft and the well-being of the crew (Ref 14 CFR part 91.3). Deviation from specified flight and operating instructions is authorized during an in-flight, emergency situation, when in the judgment of the PIC, safety justifies such action.

Responsibility for starting or continuing flight with respect to weather or any other condition affecting the safety of the aircraft rests with the PIC. The PIC is vested with the final decision regarding the aircraft's airworthiness and safe conduct of the flight. In the case of a mishap to an aircraft, the PIC is responsible for its safe custody until the aircraft has been taken into custody by proper authority IAW National Transportation Safety Board (NTSB) Title 49 Subtitle B Chapter VII Part 830 and all other FAA requirements.

2. Visual Observer (VO)

All Max Drone Service flight operations will utilize a VO. The VO may be used to assist in the Visual Line of Sight (VLOS) requirement so long as the PIC always maintains VLOS capability. The VO and the PIC must be able to communicate verbally in some manner, at all times. The VO must be positioned to assist the PIC, to exercise the see-and-avoid responsibilities required by §§ 91.111, 91.113, and 91.115 by scanning the area around the aircraft for potentially conflicting traffic and assisting the PIC with navigational awareness. Visual Observers:

- Are required for all operations.
- Must have a thorough understanding of FAA regulations for the airspace where the UAS will be operating.
- Must be responsible for only one UAS at a time.
- Must maintain immediate communication with the UAS pilot at all times. The observer must also monitor the appropriate ATC frequency when required, to enhance situational awareness.
- Must assist the PIC with maintaining the UAS within VLOS.

- Must be in position to observe the aircraft and the surrounding airspace to assist the pilot in determining:
  - The UAS's proximity to other airborne assets (participating and non-participating aircraft) and physical hazards (towers, structures, weather).
  - Prevent the UAS from becoming a collision hazard.
- Must inform the PIC prior to losing visual contact.
  - This is based on the VO's normal vision, however, corrective lenses, glasses, and contact lens are allowed. Binoculars, telephotos lens, night vision goggles, and field glasses are allowed as augmentation devices, but cannot be used as the primary means of visual contact.
- All supported operations will be conducted in Visual Metrological Conditions (VMC).
- Be trained in:
  - Crew Resource Management (CRM), FAA AC 120-51 or accepted equivalent.
    - The observer must bring any information that has an impact on operational safety and/or the safety of the mission to the attention of the PIC. The observer should convey the information clearly, giving appropriate detail in a concise, organized manner, and to state recommendations as appropriate. The observer should be prepared to respond to questions and ask questions if needed to clarify any instructions given by the PIC.
  - Applicable sections of CFR 14 (91.111, 91.113, 91.115, and 91.155).
  - ATC and pilot radio phraseology.
  - Applicable sections of the Aeronautical Information Manual (AIM).

Other Flight Crew

Ancillary personnel such as sensor operators or other specialists must be thoroughly familiar with and possess operational experience of the equipment being utilized in accordance with the operator's manual.

Crew Resource Management

The goal of Max Drone Service UAS program is to provide safe, efficient, consistent, and reliable utilization of aviation assets for the public. The aircrew members and observers are uniquely positioned and qualified to ensure that these goals are met for each and every flight. Experience has shown that a well-managed flight deck/cockpit environment, including the timely and correct exchange of information between crewmembers and the proper accomplishment of their appointed tasks, serves as one of the most effective methods by which operational safety can be enhanced. All UAS crewmembers will be trained in CRM and the PIC will ensure that all aircrew members integrate crew risk management. The current edition of FAA AC 120-51, Crew Resource Management Training, or recognized equivalent, is applicable.

Sterile Cockpit

During critical phases of flight, no crewmember may perform any duties not required for the safe operation of the aircraft. No crewmember may engage in, nor may any PIC permit, any activity during a critical phase of flight, which could distract any crewmember from the performance of his/her duties or interfere in any way with the proper conduct of those duties.

III. Airspace/Operating Environment

A. Airspace Description

Max Drone Service operations will be conducted within the Contiguous United States, during Visual Meteorological Conditions (VMC) conditions, in Class G uncontrolled airspace only and no portion of the flight will occur in Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless a specific airspace authorization is received through an amended Petition for Exemption approved by the FAA.

1. Notice to Airman (NOTAMs)

The PIC will request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to each operation. The NOTAM will contain the following information:

- Name and address of the pilot filing the NOTAM request.
- b. Location, altitude, and/or operating area.
- c. Time and nature of the activity.
- d. Number of UAS flying in the operating area.

The area of operation defined in the NOTAM will only be for the actual area to be flown for each day and defined by a point and the minimum radius required to conduct the operation.

The PIC will cancel applicable NOTAMs when UAS operations are complete or will not be conducted.

Coordination Requirements

Operators and UAS equipment will meet the requirements (communication, equipment, and clearance) of the class of airspace within which the UA will operate. In this case, it will be class G uncontrolled airspace.

PIC filing and the issuance of required distance (D) NOTAM will serve as advance ATC facility notification for UAS operations in an area.

2. Site Selection and Operational Procedures

Max Drone Service operations will occur in a closed access environment over rural uninhabited, unoccupied, private or restricted-access land. These operating areas will always be owned or managed by the person or entity that is contracting with Max Drone Service to perform the aerial application and will be planned and approved in advance of the mission.

Due to the contractual nature of the operations with landowners, no other manned crop spraying operations will occur during Max Drone Service flight operations. Further, there are areas of airspace associated with UAS operations where normal manned aircraft cannot fly. However, the PIC will remain clear and give way to any unexpected manned aviation operations and will immediately land the UAS until the manned aircraft has exited the operations area.

Operational Obstacles and Boundaries

Prior to conducting flight operations, the PIC will identify any operational area obstacles and boundaries, so to avoid collision with, or damage to property. Max Drone Service will visit the area of planned operation and inspect the terrain and vantage points prior to operations. Max Drone Service utilizes a number of tools available to capture this environmental data, including high-resolution photogrammetry, and handheld surveying tools. The result is a geo-rectified model of the unit, with GPS points accurately marking the boundaries of the geofenced flight operating area.

Controlled Access

Max Drone Service operations will occur under strictly controlled conditions in predetermined class G airspace that is, 1) Limited in scope 2) Controlled as to access by mission essential personnel only.

Non-participating Personnel

Restricted physical access, early notifications of proposed flight operations, and perimeter monitoring will be conducted in a manner to restrict access by non-participating personnel. To further ensure the area of operation is clear of all non-Participants and any other potential hazards, prior to beginning agricultural operations, a single UAS will be used to survey and access the operating environment.

All personnel at the site will be controlled by Max Drone Service at the time of flying. The Agras T-30 aircraft shall operate from on-site takeoff/landing locations directly next to the PIC and co-located VO. The PIC and the VO will be able to verbally communicate during all operations or will utilize hand-held radios on site. In addition, signage announcing future spraying operations will be posted at the site entrance warning any customer employees or non-Participants that an aerial spraying operation is occurring. This is an industry standard process.

As an added precaution, any flight within 400 feet of a potential structure will require the permission from the legal owner.

3. Roads and Boundary Setbacks

Max Drone Service aircraft will not fly directly over any roads and will remain at a setback distances consistent with the relief granted to 27c in previous approved exemptions.

Closer than 500 feet, but not less than 100 feet

Max Drone Service will operate the UA closer than 500 feet, but not less than 100 feet, from vessels, vehicles, and structures under the following conditions:

(1) The UAS is equipped with an active geo-fence boundary, set no closer

than 100 feet from applicable waterways, roadways, or structures;

- For safety reasons, geo-fencing flight limits will be enabled to operate safely and legally. The height and distance limits and Geo zones also work together to monitor flight.

(2) The PIC must have a minimum of 7 hours' experience operating the specific make and model UAS authorized under this exemption, at least 3 hours of which must be acquired within the preceding 12 calendar months;

- Max Drone Service will ensure that these minimums are met prior to operating within 500 feet but no closer than 100 feet.

(3) The PIC must have a minimum of 25 hours' experience as a PIC in dispensing agricultural materials or chemicals from a UA;

- Max Drone Service has a 14 CFR Part 137 certification and has been dispensing materials from drones for over 2 years.

(4) The UA may not be operated at a groundspeed exceeding 15 miles per hour;

- When operating within 500 feet of roads, but no closer than 100 feet, The PIC will ensure that the UA is not operated at a speed greater than 15 MPH.

(5) The UA altitude may not exceed 20 feet AGL; and

(6) The PIC must make a safety assessment of the risk of operating closer than 500 feet from those objects and determine that it does not present an undue hazard.

- Max Drone Service follows strict FAA SRM protocols and will assess each mission accordingly.

Closer than 100 feet from vessels, vehicles and structures

Max Drone Service will operate closer than 100 feet from vessels, vehicles, and structures under the following additional conditions:

(1) The UAS is equipped with an active geo-fence boundary, set to avoid the applicable waterways, roadways, or structures; and

(2) The operator must obtain permission from a person with the legal authority over any vessels, vehicles or structures prior to conducting operations closer than 100 feet from those objects.

- For safety reasons, geo-fencing flight limits will be enabled to operate safely and legally. The height and distance limits and Geo zones also work together to monitor flight.
- Max Drone Service does not anticipate a situation where they would be within 100 feet of any vessel. Max Drone Service will ensure they have the property owner's permission in the event they have to spray within 100 feet of any structure.
- Max Drone Service operates in remote rural areas with sparse traffic. In the event a vehicle should approach, and the PIC is closer than 100 feet, the PIC will maneuver the UA to remain within the 100-foot boundary until the vehicle passes.

Restricted by Time

As an even further mitigation, Max Drone Service will limit operations along the setback boundaries to time periods when traffic is sparse or non-existent and signage announcing future spraying operations will be posted alerting any potential traffic that an aerial spraying operation is occurring.

IV. EMERGENCY PROCEDURES

A. Lost Link

A lost-link safety default feature allows the UAS to automatically hover and land in response to a lost-link event. Safety features such as the GPS warning/indicator lights and speed indicator light provide critical system status information to the pilot.

The Max Drone Service pre-programmed emergency procedures also incorporate contingency plans that address emergency recovery or flight termination of the UAS in the event of unrecoverable system failure. These procedures will normally include Lost Link Points (LLP), Divert/Contingency Points (DCP) and Flight Termination Points (FTP) for each operation.

The PIC will immediately abort the flight operation if unexpected circumstances or emergencies arise that could degrade the safety of persons or property. The PIC will terminate flight operations without causing undue hazard to persons or property in the air or on the ground.

When required, the PIC will also notify local ATC of any in-flight emergency or aircraft accident as soon as practical.

B. Manual Control

If at any time there is a question that the UAS is no longer flying its programmed mission, the PIC will take manual control of the UAS and return it to the landing zone immediately under manual control. There may be minor problems that do not require emergency assumption of control. In these cases, the PIC can direct an autopilot landing or manually land the aircraft.

C. Lost Communications

1. Loss of Communications between the Observer and the Pilot in Command

Communications between the PIC and VO will be through direct communication when possible. However, when the observer and the PIC are not co-located where verbal communication is possible, the following communication tools will be utilized….

- Hand held Police radio
- Voice actuated headsets
- Cellular phone
- Hand Signals (may be used solely or in conjunction with the communication equipment)

If communication is lost and cannot be re-established the UA will immediately land.

2. Between the UAS and GCS

If there is a temporary loss of control of the UAS due to a lost communication link with the GCS, the UAS will respond to the failsafe mode IAW design specifications established in the aircraft operator's manual. The PIC will perform the procedures identified in the Max Drone Service Flight Operations Procedures Manual (FOPM).

4. GPS Failure

If there is a GPS failure and the returning telemetry from the UAS indicates as such, the PIC will follow the procedures outlined in the aircraft operator's manual.

Hazard	Severity	Likelihood
#1 Technical Issue with UAS	Major 3	Remote C
#2 Deterioration of external systems supporting the UAS operation	Minor 4	Remote C
#3 Human Error	Minor 4	Remote C
#4 Adverse Operating Conditions	Major 3	Remote C
#5 Unable to maintain VLOS	Major 3	Remote C

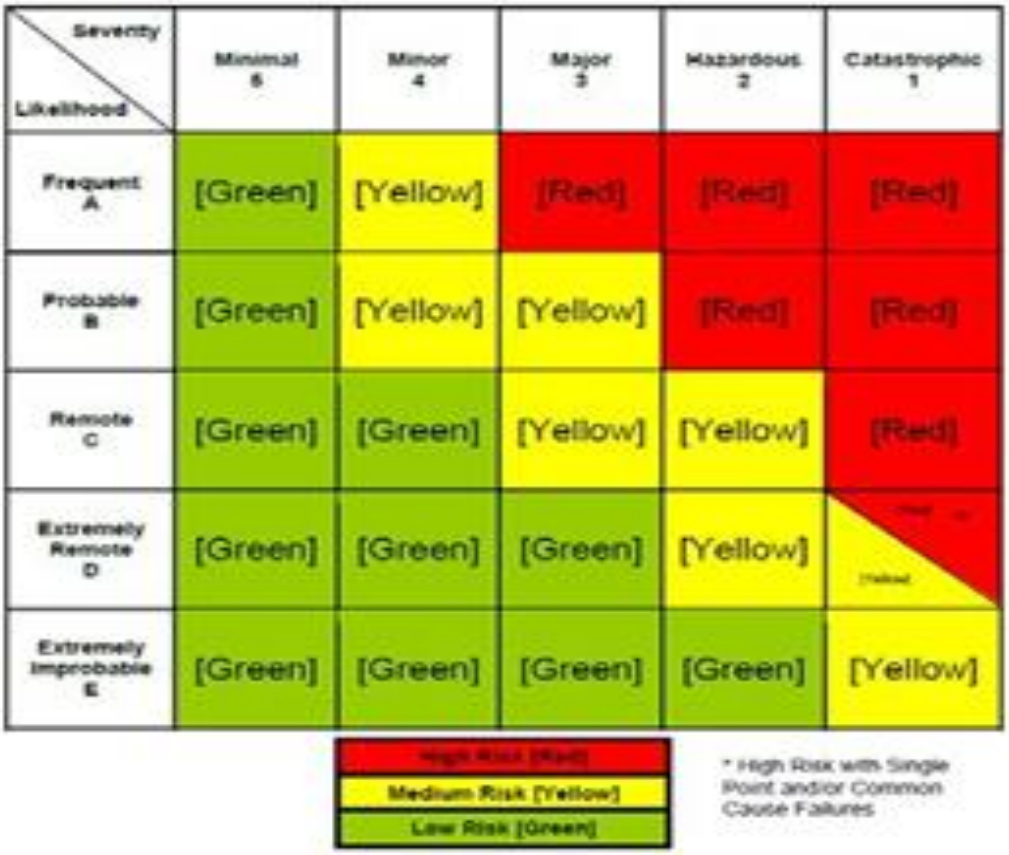
Assess safety Risks

Hazard	Initial Risk Level	Rationale
#1 Technical Issue with UAS	Medium (3C)	(e.g., The severity is determined to be **Major** based that Max Drone Service operations will occur under strictly controlled conditions in predetermined class G airspace that is, 1) Limited in scope 2) Controlled as to access by mission essential personnel only. Due to the contractual nature of the operations with private landowners, no other manned crop spraying operations will occur during Max Drone Service flight operations. Further, there are areas of airspace associated with the UAS operations where normal manned aircraft cannot fly due to the proximity to the ground and potential structures. With the added mitigations in place the likelihood is determined to be **extremely remote**. The DJI Agras T-30 is equipped with redundant flight controls and transmission systems that are adequate to maintain simultaneous control of the UAS so they remain inside the operations area. Additional sophisticated and effective Geo fencing is also in place for containment and the proven DJI Agras T-30 has logged a combined total of 1,200,000 hours flown and 20,600.000 flights without any recorded incidents.
#2 Deterioration of external systems supporting the UAS operation	Low (4C)	The severity is determined to be **minor** based on the UAS being designed from the manufacturer to manage the deterioration of external systems supporting the UAS operation. With the added mitigations in place, the likelihood is **extremely remote.** Manual control features allow PIC to immediately return to landing zone and the aircraft is equipped with GPS warning/indicator lights. The PIC will follow the procedures outlined in the aircraft operator's manual for GPS failure and I the event of a communications failure, the PIC will immediately land the UASs.
#3 Human Error	Low (4C)	The severity is determined to be **minor** based on all crewmember's initial and recurrent training with a complete knowledge of the regulations, limitations, restrictions under which they operate as a Part 107 certified remote pilot and Part 137 certified agricultural operators. UASs will be maintained IAW manufacturer procedures and remain in a flight ready condition. With the added mitigations in place, the likelihood is **extremely remote.** Team checklists IAW Max Drone Service training manual and the FOPM will be adhered to and all crew members are trained and fully knowledgeable in crew resource management. The Automated features also protects the flight envelope from human error.
#4 Adverse Operating Conditions	Medium (3C)	The severity is determined to be **major** based the potential for adverse weather conditions during seasonal crop spraying operations. With the added mitigations in place, the likelihood is **extremely remote.** Operations will occur in VMC conditions only. The PIC and the VOs are trained to identify critical environmental conditions and to avoid them. Environmental conditions for safe operations are defined, measurable and adhered to with up to date

		weather forecasts and vigilance during flight operations. In the event of a weather degradation event, the PIC will land the aircraft.
#5 Unable to maintain VLOS	Medium (3C)	The severity is determined to be **major.** The PIC and VOs are properly trained in §§ 91.111, 91.113, and 91.115, and 107.37 and the PIC and VO will be positioned at visual vantage points in the operations area. With the added mitigations in place, the likelihood is **extremely remote.** Time of day operating restrictions and restricting operations within certain boundaries or airspace volumes minimizes this risk. Operations will be restricted in time and flight termination will occur in the event the PIC or a VO is unable to maintain VLOS with the UAS during flight.

Additional Safety Control and Residual Safety Risk

Hazard	Additional Controls	Severity	Likelihood	Residual Risk Level
#1 Technical Issue with UAS	No flights around other manned aircraft. Emergency procedures in place and validated. Recommendations of the Monte Carlo Model for setback boundaries adhered to.	Major	Extremely Remote	Green (3D)
#2 Deterioration of external systems supporting the UAS operation	If at any time there is a question that the UAS is no longer flying its programmed mission, the PIC will take manual control of the UAS and return it to the landing zone immediately under manual control.	Minor	Extremely Remote	Green (4D)
#3 Human Error	Recurrent human factors training. Pre and post flight briefings and lessons learned.	Minor	Extremely Remote	Green (4D)
#4 Adverse Operating Conditions	UAS designed and qualified for adverse environmental conditions	Major	Extremely Remote	Green (3D)
#5 Unable to maintain VLOS	Corrective lenses, glasses, and contact lens are allowed. Binoculars, telephotos lens, night vision goggles, and field glasses are allowed as augmentation devices. All supported operations will be conducted in VMC.	Major	Extremely Remote	Green (3D)



Severity / Likelihood	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Frequent A	[Green]	[Yellow]	[Red]	[Red]	[Red]
Probable B	[Green]	[Yellow]	[Yellow]	[Red]	[Red]
Remote C	[Green]	[Green]	[Yellow]	[Yellow]	[Red]
Extremely Remote D	[Green]	[Green]	[Green]	[Yellow]	
Extremely Improbable E	[Green]	[Green]	[Green]	[Green]	[Yellow]

Medium Risk [Yellow]

Low Risk [Green]

* High Risk with Single Point and/or Common Cause Failures

The completed analysis reflects no residual risk levels of medium or high and in addition to this SRM, all Max Drone Service UAS flight operations will comply with provisions in the FOPM, Aircrew Training Manual, and SMS to assure all current risk controls are valid and adequate.